



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Thomas A. Koes

Examiner: Sin J. Lee

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For: PHOTORESIST COMPOSITION

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Commissioner for Patents
P.O. Box 1450
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DECLARATION UNDER 37 C.F.R. §1.132

YANG declares that:

1. he is a vice-manager of the photoresist division of Eternal Chemical Co., LTD, the assignee of the above-identified application;
2. he has been professionally involved in the development and production of photoresists for several years;
3. he had conducted, under his supervision, an experiment, involving a series of photoresists, which establish that the utilization of a concentration of a non-polymerizable organic acid in a photoresist composition in the range claimed in the present application significantly reduces the time required to strip the photoresist;
4. the experiment involved the preparation of six negative-acting photoresist compositions, denoted as Samples D, E, F, G, H and I. Each composition was prepared by the combination of the components set forth in Table 3 in the weight amounts mentioned therein. It is noted that Sample D included no non-polymerizable acid, e.g.

o-phthalic acid, and Sample E included o-phthalic acid in a concentration of less than 0.5 part per 40 parts of polymeric binder on a dry weight basis. Samples F, G and H included o-phthalic acid in concentrations within the range claimed for the photoresist composition of the present invention. Sample I included o-phthalic acid in a concentration in excess of 5 parts per 40 parts of polymeric binder on a dry weight basis. Table B appears below:

TABLE 3

Sample:	D	E	F	G	H	I
(Meth)-acrylate Binder						
Polymer 5(g)	28	28	28	28	28	28
(Meth)-acrylate Binder						
Polymer 6(g)	16	16	16	16	16	16
Photomonomers(g)	30	30	30	30	30	30
Photoinitiators(g)	3.5	3.5	3.5	3.5	3.5	3.5
O-phthalic acid(g)	0	0.2	0.55	2.2	4.4	6
Adhesion promoters(g)	0.1	0.1	0.1	0.1	0.1	0.1
Dye(g)	0.35	0.35	0.35	0.35	0.35	0.35
Other Components(g)	0.1	0.1	0.1	0.1	0.1	0.1

5. A packaging film in accordance with Claim 1 wherein said block copolymer comprises a mono alkenyl arene homopolymer glassy block and a controlled distribution copolymer of an olefin and a conjugated diene elastomeric block;

6. each of the sample compositions, prepared by conventional techniques, were dry film photoresists. Each of the sample photoresist compositions were laminated, as 38 micron-thick dry films onto copper substrates, at a temperature of $110^{\circ} \pm 5^{\circ}\text{C}$, a pressure of 3.0 Kg/cm^2 , and at a lamination velocity of 1.5 meters/min. The photoresist samples were exposed by a ROC EXM 1201F collimated light printer and then developed on 55% B.P. for copper 9/21st step held. Post development performance was checked for adhesion and resolution by microscope. The samples were stripped and completely removed from the substrate by application of a 3% caustic solution applied to the photoresist laminate at 130°F . The time it took to completely remove the photoresist, in seconds, is reported as the resist strip time. The processing conditions and results for each of Samples D to I are summarized in Table 4. Table 4 is as follows:

TABLE 4

Sample:	D	E	F	G	H	I
Develop Breakpoint (sec)	23	23	23	22	21	21
Photospeed (Cu 9) (mJ/cm^2)	60	60	60	60	60	60
Adhesion (μm)	22	22	22	24	26	30
Resolution (μm)	28	28	28	28	30	32
Resist Strip Time (sec)	44	44	40	36	32	31

7. the results summarized in Table 4 establishes that the photoresist composition of the present application provides reduced photoresist strip speed compared to photoresist compositions of the prior art; and

8. all statements made of his knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of this application or any patent issued thereon.

Further declarant sayeth not.

Date: 2005/05/18

Ming-Hsing Yang
YANG